

Appendix D

Historical Information including:

1. Regional Development and Facility History Narrative
 - 1A – Section 2 of the 2003 SEER – Facility Background and Land Use
2. Land Use/Drainage Plan of Chevron Facility (1993) – Coastal Environmental Services
3. Woodbridge Creek Industrial Facilities Adjacent to the Chevron Northfield Basin Area (1978)
 - a. Overview Map
 - b. Industrial, Filling Activities, and Drainage Features
4. Woodbridge Creek at Arthur Kill, Former Chevron Refinery and Areas North
5. Map Showing Extent of September 1990 Spill at Amerada Hess Site to Land and Woodbridge Creek
6. Map Showing Extent of 1983 Spill at Amerada Hess Site to Land
7. Historical Map (1920s) of the Maurer Section of Perth Amboy with Brickworks and American Smelting and Refining Company (ASARCO)
8. Historical Map (1921) showing the Barber Asphalt Company
9. Historical Aerial Photograph (1966) of Industrial Areas Upstream of Chevron (Historicalaerials.com)
10. Regional Historic Fill Map – NJDEP GeoWEB February 2020

Appendix D
Regional Development and Facility History
Sediment Investigation Report
Former Chevron Facility – Perth Amboy/Woodbridge, Middlesex County, NJ

The major milestones in the ownership and operations of the former Perth Amboy Refinery are summarized below. Further detail regarding the Facility's history was described in the 2002 RFI.

Pre-Chevron Operations (1874-1945)

Various lots were combined into the overall property that was developed and occupied by Chevron or its predecessor (CALOIL) as the Facility. However, prior to the development of the Facility as a refinery, other industries occupied and operated on portions of what was to become the Facility, as described below:

- 1874 - Henry Maurer purchased and operated a fire brick manufacturing facility and established a company town (Maurer) on Woodbridge creek in the area of what was referred to as the East Yard. The area of Perth Amboy identified as Maurer is visible on the ___ topographic map of the area.
- 1889 - The Barber Asphalt Company began operations, and their facility is visible on multiple Sanborn Maps. Barber's operations and processes were likely similar to asphalt manufacturing operations common in the northeast.
- 1920–1946 - Barber Asphalt built and operated a 6,700-barrel-per-day (bpd) asphalt refinery. The refinery was built to serve the New York market and the site provided ready access to New York Harbor.
- 1945 - Standard Oil of California (SOCAL) leased storage tanks and wharf facilities from Barber Asphalt to handle a possible gasoline surplus after World War II.

California Refinery/Chevron Operations (1946-1994)

This period saw the transformation and expansion of the petroleum refining operations at the Facility, beginning with the purchase of the former Barber Asphalt Company through the rest of the twentieth century. The major administrative and environmental milestones are noted below.

- 1946 - SOCAL purchased the Barber Asphalt Company and formed two companies: California Refinery Company (containing mostly former Barber employees) and the California Oil Company (CALOIL) (Marketing).
- 1950 - 1951 CALOIL constructed and commenced operations at the new 89,000 bpd refinery.
- 1965 - Company name changed from to Chevron Oil Company.
- 1976 - Chevron started up the new Effluent Treatment Plant (ETP). The new biodisk system improved the quality of the water leaving the Refinery by 500 percent. Prior to the construction of the ETP, Refinery stormwater was apparently discharged to both Woodbridge Creek and the Arthur Kill after treatment. Process water from refining operations was likely discharged to Woodbridge Creek after treatment that included oil-

water separation and other processes. It should be noted that the history of Facility storm, waste, and process water management was detailed in the August 1994 DOCC report, and summarized in the SFSAP.

1994 - USEPA issued an HSWA Permit to Chevron.

Facility Remediation and Closure (1995-2012)

Chevron incrementally terminated its main Facility operations and conducted several phases of environmental investigation and remediation activities during this period, e.g., the 2002-2003 RFI. The environmental investigation and remediation activities included compliance with the investigative provisions of the HSWA permit and other directives, with the USEPA as the lead oversight agency. Multiple environmental remediation projects addressing the various individual SWMUs, AOCs, and LNAPL areas were undertaken during this period. Key environmental management milestones are summarized below.

- 1995 - Chevron installed a material processing/stockpile pad for temporary storage of treated sludge and processing/treatment units associated with remediation and closure of the East Yard Basin (EYB).
- 1996 - Chevron installed continuous sheet piling around the North Field Basin (NFB) (SWMU 1) and Surge Pond (SWMU 2) to aid in the geotechnical stability of the basin and pond during remediation and closure activities.
- 1996 - Chevron constructed a material handling area in the Main Yard consisting of a staging pad, an area for stockpiling of material, and a truck scale.
- 1997 - Chevron installed a concrete containment pad north of the existing North Field processing pad to provide containment for a shaker screen used for the NFB and Surge Pond Closure Project.
- 2003 - Chevron sold the West Yard Area (27 acres) to Matrix Development Group following the completion of remedial activities conducted in accordance with an NJDEP-approved work plan. This area was subsequently re-developed as part of the overall Perth Amboy redevelopment plan. The RFI report was completed in 2003 for multiple large areas of the Facility including AOCs, SWMUs, LNAPL areas, and waterways and submitted to the USEPA/NJDEP.
- 2005 - Chevron sold Amboy Field (72 acres) to Morris Realty Associates following the completion of remedial activities conducted in accordance with a Memorandum of Agreement (MOA) with NJDEP dated May 3, 1998. This area was subsequently re-developed as part of the overall Perth Amboy redevelopment plan.
- 2008 - Chevron ceased asphalt production.
- 2012 - Chevron sold the Facility to Buckeye Perth Amboy Terminal, LLC, in July 2012. The sale of the Facility triggered NJDEP ISRA requirements, including the submittal of a Remedial Investigation (RI) report on all 95 Potential AOCs (PAOCs) by May 7, 2014.

Current Operations (2012-Present)

Since 2012, Buckeye Perth Amboy Terminal, LLC has owned and operated the Site as one of their Global Marine Terminals for product storage, blending, and distribution. Crude, refined products, gasoline, and butane are handled at the facility. This facility is connected to the Colonial and Buckeye pipelines. Buckeye currently monitors effluent discharges from the ETP to Woodbridge Creek under its Facility Wastewater. Chevron continued to implement environmental remediation projects during this period to address the various SWMUs, AOCs, and LNAPL areas; the associated major activities and milestones. are summarized below.

- 2013 USEPA issued a HSWA Permit to Chevron and Buckeye Perth Amboy Terminal, LLC.
- 2013 Chevron submitted the Corrective Action Management Unit (CAMU) Final Design report (November 2013).
- 2012 USEPA approves CAMU Final Design; CAMU areas constructed (2013) and currently operational; closure of the CAMU areas scheduled for 2020.
- 2014 Chevron completed a second sediment investigation phase in Spa Spring Creek, and Woodbridge Creek as part of a Supplemental Ecological Evaluation.
- 2016 Chevron submitted the SEER to the USEPA/NJDEP
- 2019 Chevron completed additional sediment sampling, the results of which are summarized in Appendix A of the Sediment Report.

2.0 FACILITY BACKGROUND AND LAND USE

This section provides an overview of the history and current operations at the Refinery. Section 2.1 describes the major milestones in the history of the Refinery. Section 2.2 describes the location and layout of the Refinery and surrounding land use. Section 2.3 provides an overview of historic and recent waste management practices at the Refinery, and in particular, the management and treatment of process water and stormwater runoff. Section 2.4 describes the history and current status of the Refinery's environmental permits.

2.1 History of Ownership and Operation

The major milestones in the ownership and operations of the Perth Amboy Refinery are:

- 1889 Barber Asphalt Company started.
- 1920-1946 Barber Asphalt built and operated a 6,700 barrel per day (bpd) asphalt refinery. The refinery was built to serve the New York market and the site provided ready access to New York Harbor.
- 1945 Standard Oil of California (SOCAL) leased storage tanks and wharf facilities from Barber Asphalt to handle a possible gasoline surplus after World War II.
- 1946 SOCAL purchased the Barber Asphalt Company and formed two companies: California Refinery Company (containing mostly former Barber employees) and the California Oil Company (CALOIL) (Marketing).
- 1950 CALOIL broke ground to expand the Perth Amboy facility into a full service refinery.
- 1951 CALOIL began to operate the new 89,000 bpd refinery. The Houdry Catalytic Cracker became a dominant landmark on the central New Jersey horizon.
- 1965 Company name changed from California Oil Company to Chevron Oil Company - Eastern Division to facilitate corporate realignment.
- 1973 Chevron began Perth Amboy Refinery Modernization (PARM) project.
- 1975 Chevron started up a new Rheniformer, Vacuum Gas Oil (VGO) Isomax and an 80,000 bpd crude unit. This increased the Refinery's capacity to 168,000 bpd.

-
- 1976 Chevron started up the new ETP. The new biodisk system improved the quality of the water leaving the Refinery by 500 percent.
- 1977 Chevron Oil Company - Eastern Division became the Northeast Division of Chevron U.S.A., Inc., as part of corporate reorganization.
- 1981 Chevron started up new sulfur recovery facilities. These facilities increased sulfur recovery capacity by 33 percent to 200 long tons of sulfur per day, while improving stack emissions by over 500 percent.
- 1983 Chevron shut down several process units and scaled back the Refinery operation to asphalt topping in response to the economic situation in the northeast light products market.
- 1990-1992 The 1950's vintage plants were dismantled and demolished.
- 1992 Chevron added a railcar asphalt loading rack to the Central Yard.
- 1992-1993 Chevron constructed a new power plant and sodium hydrosulfide (NaSH) plant and decommissioned the old power plant and No. 2 Sulfur Recovery Unit (SRU) caustic scrubber.
- 1994 EPA issued a HSWA Permit to Chevron.
- 1995 Chevron installed a material processing/stockpile pad for temporary storage of treated sludge and processing/treatment units associated with the East Yard Basin (EYB) Remediation and Closure. The construction of the pad has potential impacts on corrective action activities at AOC 14 and SWMU 26.
- 1995 Chevron constructed a spill containment unit for the spent caustic loading rack in the Main Yard to control potential spills during loading of spent caustic into tanker trucks and rail cars. The construction of the unit has potential impacts on corrective action activities at AOC 8, AOC 15 and AOC 16.
- 1995 Chevron constructed the Marine Vapor Recovery unit in the East Yard to recover petroleum vapors released during product transfers from barges and tankers to Refinery tanks. The construction of the unit has potential impacts on corrective action activities at AOC 14.
- 1995 Chevron paved parking areas and roadways in the Main Yard and North Field areas of the Refinery. The new parking areas and roadways may have potential impacts on corrective action activities at SWMU 24, SWMU 40, AOC 8 and AOC 10.
-

- 1996 Chevron installed continuous sheet-piling around the North Field Basin (NFB) (SWMU 1) and Surge Pond (SWMU 2) to aid in the geotechnical stability of the Basin and Pond during remediation and closure activities. The installation of the sheet piling may have potential impacts on corrective action activities at SWMU 5, SWMU 21 and SWMU 43 (collectively grouped as SWMA 3).
- 1996 Chevron constructed a material handling area in the Main Yard consisting of a staging pad, an area for stockpiling of material and a truck scale. The construction of the material handling area may have potential impacts on corrective action activities at SWMU 44.
- 1996 Chevron expanded the containment/diversion slab around Tank 723 located in the Main Yard to bring the tank into compliance with federal and state spill prevention, containment and countermeasures regulations. The expansion of the containment/diversion slab may have potential impacts on corrective action activities at AOC 10.
- 1997 Chevron expanded the North Field processing pad located in the vicinity of the NFB and Surge Pond. The expansion of the processing pad may potentially impact corrective action activities at SWMA 3.
- 1997 Chevron installed a 24-inch above ground stormwater line to Tanks 326 and 327 in the North Field. The installation of the stormwater line may have potential impacts on corrective action activities at SWMU 35.
- 1997 Chevron installed a concrete containment pad north of the existing North Field processing pad to provide containment for a shaker screen used for the NFB and Surge Pond Closure Project. The installation of the containment pad may have potential impacts on corrective action activities at SWMA 3.
- 1999 Chevron formed the Chevron Environmental Management Company (CEMC) to manage environmental issues.
- 2000 Chevron installed a hot oil heater in the East Yard in order to increase asphalt production capacity. The installation of the hot oil heater may have potential impacts on corrective action activities at AOC 28.

2.2 Location and Land Use

This section describes the location and layout of the Refinery and the history and layout of the NFE. It also describes the land use adjacent to the Refinery and the wetlands at the Refinery.

2.2.1 Site Location and Layout

The Refinery is situated on a 368-acre site in Perth Amboy and Woodbridge, Middlesex County, New Jersey. Figure 2-1 is a site vicinity map showing the Refinery's location and current land use status. This map shows a 1-mile radius line around the Refinery. The Refinery currently receives heavy crude oil from tankers and refines it into finished asphalt, cement and intermediate products.

Figure 2-2 is the Refinery basemap, which shows the property lines, buildings, roads, railroads and creeks at the Refinery. Figure 2-2 also shows the locations of the SWMUs and AOCs, the existing and demolished aboveground storage tanks, pipeways and the OWSS. The site is bounded to the north and south by industrial properties. The site is bounded to the west by commercial and residential properties along Convery Boulevard (State Highway 35). The site is bounded to the east by the Arthur Kill, which provides the Refinery with docking berths for tanker ships. Woodbridge Creek flows from the northwest to southeast through the northern portion of the Refinery. Spa Spring Creek flows along the northern property boundary and discharges into Woodbridge Creek. An aerial photograph of the Refinery (April 2003) is included as Figure 2-3.

Amboy Avenue runs north-south through the western portion of the Refinery and State Street runs north-south through the eastern portion of the Refinery. Maurer Road crosses east-west through the central portion of the Refinery and connects Amboy Avenue to State Street.

The Refinery is divided into six major geographical areas referred to as Amboy Field, the West Yard, the Central Yard, the North Field/Main Yard, the East Yard and the NFE. The contents of this Report address three of these areas, as described below.

Central Yard

The Central Yard is triangular in shape, and is bounded to the north by Maurer Road, to the west by the New Jersey Central Railroad (NJCR) tracks and to the east by State Street. It contains above ground storage tanks (ASTs) for crude oil and asphalt, the Asphalt Railcar Loading Rack and the Shops Building. The Central Yard also formerly contained process units including the Catalytic Cracker, No. 2 Rheniformer and Alky Plant, which were dismantled in 1991 and 1992, as well as former storage vessels, a motor fueling station with an underground storage tank (UST), loading racks and a dumpster storage area.

North Field/Main Yard

The Main Yard is situated between Maurer Road to the south, the NJCR tracks to the west, State Street to the east and is separated from the North Field by Barber Street, which runs northwest-southeast. The Main Yard has been the primary process area throughout the history of the Refinery. Chevron processes crude oil into asphalt and intermediate products at Crude Unit No. 5, which has a capacity of approximately 60,000 bpd of heavy crude oil. The Main Yard also has piping and pumps, a bulk loading rack, the New Power Plant and

the NaSH Plant. The Main Yard previously contained Crude Units No. 3 and No. 4, the Hydrotreater and VGO Isomax, Hexane Plant, Rheniformer, Perth Amboy Warehouse and Lead Plant, which were demolished in 1991 and 1992 and sold for scrap.

The North Field is situated along the south bank of Woodbridge Creek. It consists of ASTs for stormwater and NaSH, piping and pumps, the ETP and the Fire Fighting Training Ground (FFTG). Chevron formerly utilized several areas in the North Field to manage process water and stormwater including the NFB (SWMU 1), the Surge Pond (SWMU 2) and three former ponds (SWMUs 38 to 40). Chevron currently uses the Short Term Hazardous Waste Storage Area (SWMU 30) in the North Field to store solid wastes from Refinery operations for no longer than 90 days.

East Yard

The East Yard is situated along the west bank of the Arthur Kill and is bordered by State Street to the west. It consists of ASTs for naphtha, distillate, crude oil, asphalt and stormwater in addition to the Asphalt Plant, asphalt truck loading racks, wharf, EYB, Tires, Batteries and Accessories Warehouse (polychlorinated biphenyl (PCB) Storage), Asphalt Air Blowing Plant, Diesel Fuel Station UST, Truck Scale and the Administration Building with Annex.

2.2.2 History and Layout of the North Field Extension

The NFE is an isolated portion of Refinery property with a unique history. Companies other than Chevron have used the NFE as an industrial property. However, while Chevron is the current owner of the NFE, it has never been used for any Refinery operations. For this reason, a separate history has been prepared for the NFE.

The NFE is a 29.33-acre triangular-shaped piece of property located on the northeast bank of Woodbridge Creek. The NFE is bordered by the NJCRR to the east, Woodbridge Creek to the south and west and Shell Oil and CP Chemicals to the north.

As of 1909, various sections of the NFE were owned by Woodbridge Township, The Boynton Real Estate Company and private citizens. Between 1910 and 1913, portions of the NFE were sold to Electric Smelting and Aluminum Company of Illinois (ESAC (Illinois)). In 1920, ESAC (Illinois) reconstituted itself as ESAC (Ohio), and later changed its name to Cowles Detergent Company.

In 1945 to 1946, Vulcan Detinning Company purchased the NFE in several transactions. As part of the sale of the Cowles Detergent Company land, Vulcan Detinning Company leased an approximately 15-acre block back to the Cowles Detergent Company. In approximately 1956, Vulcan Detinning Company became Vulcan Materials Company.

On February 28, 1958, California Oil Company, now known as Chevron U.S.A., Inc., purchased the NFE from the Vulcan Materials Company. Cowles Detergent Company

continued to lease the property until approximately 1965. In approximately 1964, CP Chemicals purchased property immediately to the north and contiguous to the NFE. Four diked ponds and a potential fifth pond/overspill have been identified at the NFE. The long pond along Woodbridge Creek is identified as SWMU 46 - NFE Lagoon 1. The three diked impoundments in a series are identified as SWMU 47 - NFE Lagoon 2, SWMU 48 - NFE Lagoon 3 and SWMU 49 - NFE Lagoon 4. The fifth potential lagoon is identified as AOC 12 - Potential NFE Lagoon 5. Also on the NFE are SWMU 50 and AOC 11, which are the Former NFE Debris Pile and Potential Debris Pile Adjacent to Former Building on the NFE, respectively.

Chevron is nearing the end of the negotiation of an agreement which will provide for transfer of the property to other parties and for the full investigation and remediation of the SWMUs and AOCs in the NFE. Chevron expects these negotiations to be completed shortly.

2.2.3 Land Use Adjacent to the Refinery

This section discusses the residential, recreational and industrial uses of the properties adjacent to the Refinery.

2.2.3.1 Residential

Residential properties border the south and west side of Amboy Field, the south side of the West Yard and the southwest portion of the Central Yard.

2.2.3.2 Recreational

The primary recreational areas bordering the Refinery include Spa Spring Creek, Woodbridge Creek and the Arthur Kill. Based on the classifications given to Spa Spring Creek and Woodbridge Creek, the designated uses for these areas include primary and secondary contact recreation. Based on the classification given to the Arthur Kill, the designated uses include secondary contact recreation.

2.2.3.3 Industrial

The following industrial properties have historically, or currently border the Refinery:

- Witco Chemical;
- Bird and Sons Landfill;
- Joline Properties;
- American Smelting and Refining Company (ASARCO);
- Amerada Hess;
- American Cyanamid;
- Jadler Metals;

- Texeira's Bakery;
- Englert;
- Russel Stanley Corporation;
- CP Chemical Inc.;
- Shell Oil Company;
- Empire Polymer Corporation; and
- V&S Amboy Galvanizing.

In addition, there are small businesses along State Street that border Chevron's Central Yard, including R&L Towing, T&I Transmissions, Sylvan Industrial Piping and Abe Golub Used Cars. Descriptions of these properties, including available information regarding potential environmental issues related to their operation, were documented in Chevron's report entitled *Description of Current Site Conditions* (DOCC) (ESE, August 1994).

2.2.4 Wetlands

Seven wetland areas have been identified at the Refinery. As discussed below, three of these wetlands have been filled in compliance with Chevron's *Freshwater Wetlands Statewide General Permit* (No. 1216-0001.4).

In December of 1989, Chevron delineated the wetlands boundary on a 31-acre portion of the East Yard and North Field. These areas of the Refinery drain into Spa Spring Creek, Woodbridge Creek and the Arthur Kill. Chevron identified approximately 10 percent of the study area as wetlands and waterways of the United States. The 3.5 acres of wetlands delineated in the investigation area include 0.3 acres of fresh water wetlands and 3.2 acres of tidal wetlands. These wetlands are described as Wetland Areas I, II, III and IV (Table 2-1).

Table 2-1. Description of Wetland Areas

Name	Location	Type	Value	Acres
Wetland Area I	West of the EYB	Low-Lying Palustrine Emergent (PEM)	Ordinary Resource Value	0.05
Wetland Area II	South of the Surge Pond in the North Field	Low-Lying Palustrine Emergent (PEM)	Ordinary Resource Value	0.06
Wetland Area III	South of the Surge Pond in the North Field	Isolated Palustrine Emergent (PEM)	Ordinary Resource Value	0.16
Wetland Area IV	Adjacent to Spa Spring Creek and Woodbridge Creek	Estuarine Intertidal Emergent (E2EM)	Intermediate Resource Value	3.2

In a January 15, 1992 Letter of Interpretation from NJDEP, a boundary for wetlands delineated in the NFE was verified. These freshwater wetlands were determined to be of intermediate resource value.

In 1995, Chevron delineated wetlands along Woodbridge Creek from the Surge Pond to State Street, and in the area south of Garretson Avenue in the Central Yard. These areas were assessed to be State Open Waters and ordinary resource value wetlands, respectively. Chevron did not file an Application for a Letter of Interpretation and Line Verification in this case.

In 1997, as part of the RCRA Closure Project, Wetland Areas I, II and III, with a combined total of 0.27 acres, were filled to expand a concrete processing and containment pad and for work associated with the closure of the EYB in compliance with Chevron's *Freshwater Wetlands Statewide General Permit*.

2.3 Overview of Waste Management Practices

The available information concerning the waste management history of the individual units identified in the HSWA Permit was documented in the DOCC. An overview of the existing SWMUs and AOCs is presented in Table 2-2.

Table 2-2. Overview of Existing SWMAs, SWMUs and AOCs

SWMU /AOC	Yard	Designation
SWMA 1	NF	SWMU 27 - TEL Weathering Area, SWMU 29 - Fines Transfer Area, SWMU 39 - Unnamed NF Pond, AOC 5 - Petroleum Substance Near UST E3 and AOC 7 - Tarry Material at MW-13
SWMA 2	NF	SWMU 30 - Short Term Storage Area, SWMU 38 - NF Slop Pond and SWMU 28 - Buried Reactor
SWMA 3	NF	SWMU 5 and 21 - TEL Burial Sites and SWMU 43 - Mud Flats
SWMA 4	NFE	SWMU 46 - NFE Lagoon 1, SWMU 47 - NFE Lagoon 2, SWMU 48 - NFE Lagoon 3, SWMU 49 - NFE Lagoon 4 and AOC 12 - Potential NFE Lagoon 5
SWMU 1	NF	North Field Basin (closure)
SWMU 2	NF	Surge Pond (closure)
SWMU 3	EY	East Yard Basin (closure)
SWMU 4	ATF	Landfarm (closure)
SWMU 6	NF	TEL Burial (north of Tank 306)
SWMU 7	NF	TEL Burial (east of Tank 305)
SWMU 8	EY	TEL Burial (northwest of EYB)
SWMU 9	EY	TEL Burial (north of Tank 753)
SWMU 10	EY	2 TEL Burials (southwest of Tank 771)
SWMU 11A	CY	TEL Burial (along railroad tracks)
SWMU 11B	CY	2 TEL Burials (along railroad tracks)
SWMU 12	CY	3 TEL Burials (west of Tank 27)
SWMU 13	CY	TEL Burial (west of Tank 28)

Table 2-2. Overview of Existing SWMAs, SWMUs and AOCs

SWMU /AOC	Yard	Designation
SWMU 14	CY	2 TEL Burials (east of Tank 23)
SWMU 15	CY	TEL Burial (south of Tank 14)
SWMU 16	NF	TEL Burial (south of Tank 306)
SWMU 17	NF	TEL Burial (east of Tank 301)
SWMU 18	NF	TEL Burial (west of Tank 301)
SWMU 19	NF	TEL Burial (west of Tank 326)
SWMU 20	NF	TEL Burial (east of Tank 302)
SWMU 22	NF	TEL Burial (east of Tank 329)
SWMU 23	ATF	TEL Burial (west of Tank 116)
SWMU 24	NF	TEL Weathering (east of Tank 9209)
SWMU 25	EY	TEL Burial (northeast of EYB)
SWMU 26	EY	TEL Burial (south of EYB)
SWMU 28	NF	Reactor Burial (see SWMA 2)
SWMU 31	NF	Effluent Treatment Plant
SWMU 32	EY	PCB Waste Storage Building
SWMU 33	WY	Temporary Slurry Pit
SWMU 34	CY	Dumpster and Drainage Area
SWMU 35	NF	No. 4 Separator (and AOC 6A)
SWMU 36	EY	Oil/Water Separator
SWMU 37	WY	West Yard Sludge Pond
SWMU 40	NF	Old Pond
SWMU 41	NF	Drying Area
SWMU 42	EY	East Yard Crude Slab
SWMU 44	MY	Unnamed Main Yard Pond
SWMU 45	EY	Surface Impoundment (south of EYB)
SWMU 50	NFE	Former NFE Debris Pile No. 1
SWMU 51	MY	Oily Soil Pad
SWMU 52	CY	TEL Burial (southwest of Tank 13)
SWMU 53	NF	Potential Discharge of Tank Basin 312
AOC 1	MY	Potential Discharge of Tank 1
AOC 2	MY	Potential Discharge of Tank 3
AOC 3	MY	Potential Discharge of Tank 4
AOC 4	ATF	Potential Discharge of Tank 106
AOC 6A	NF	Oily Material (B26 & B34)
AOC 6B	EY	Oily Material (B29, B30 & B31)
AOC 6C	EY	Oily Material (B32 & B33)
AOC 8	MY	Oily & Tarry Material (B27 & B28)
AOC 9A	NF	Contamination at NF-10
AOC 9B	NF	Contamination at NF-11
AOC 10	MY	Stained Soil & Gravel Near IAF Tank
AOC 11	NFE	Potential Debris Pile in NFE (building)
AOC 13	EY	Oily Fill Material (B11)

Table 2-2. Overview of Existing SWMAs, SWMUs and AOCs

SWMU /AOC	Yard	Designation
AOC 14	EY	GWQAP Oily Fill Area III
AOC 15	NF	Oil Release at Buckeye Pipe Manifold
AOC 16	ALL	Oily Water Sewer System
AOC 17	MY	Potential Discharge at Tank 20
AOC 18	MY	Potential Discharge at Tank 2
AOC 19	MY	Main Yard Pipeway
AOC 20	ATF	Aboveground Product Pipe Manifold
AOC 21	EY	Maurer Road Excavation
AOC 22	CY	Shops Building GW Contamination
AOC 23	NF	Tank Basin 327
AOC 24	MY	Release at Fire Hydrant (northwest of Tank 4)
AOC 25	CY	Release at Former Cat Cracker
AOC 26	EY	East Yard Bunker Slab
AOC 27	EY	Tank 777 Pipeway
AOC 28	EY	Asphalt Plant Tanks
AOC 29	EY	5 Berth Coal Tar
AOC 30	CY	Tank 27 Pipeway
AOC 31	EY	Tank 772 Pump Load Structure
AOC 32	CY	Tank Basin 16
AOC 33	MY	Tank Basin 314
AOC 34	MY	Tank Basin 315
AOC 35	EY	Tank Basin 771

ALL: Refinery-Wide investigation

ATF: Amboy Tank Field

CY: Central Yard

EY: East Yard

MY: Main Yard

NF: North Field

NFA: No Further Action

WY: West Yard

The remainder of this section provides an overview of Chevron's management of process water and stormwater runoff. General wastewater management operations can be divided into three main periods: (1) prior to 1976; (2) between 1976 and 1987; and (3) after 1987. These divisions are based upon the construction of the ETP in 1976 and the removal of the stormwater surface impoundments from service in approximately 1987.

Prior to 1976

Prior to the construction of the ETP, Refinery stormwater and wastewater was apparently discharged to both Woodbridge Creek and the Arthur Kill. No information is available regarding potential discharge(s) to Spa Spring Creek during this period.

- **East Yard Discharges:** Discharges from the East Yard to the Arthur Kill were treated by an oil/water separator, referred to as the Oil Water Separator Near EYB (SWMU 36), which was operated from approximately 1950 to 1976. The fates of the settled solids and recovered oil from this unit are

currently unknown. No information is currently available regarding the management of East Yard stormwater and wastewater prior to 1950.

- **Other Discharges:** Wastewater discharges from the Central Yard, West Yard, Main Yard and North Field were routed through the OWSS (AOC 16) to several oil/water separator systems located in the North Field. The oil/water separator systems recovered oil and removed suspended solids by settling. The effluent from the oil/water separator systems were discharged through the NFB (SWMU 1) to Woodbridge Creek.

Information regarding which specific areas within the Refinery were routed to the individual oil/water separator systems is currently unavailable. The oil/water separator systems included:

- **Old Pond (SWMU 40):** The No. 1 Separator was connected to the "Old Pond". The Old Pond was operated from prior to 1940 to approximately the early 1970's. Aerial photos indicate that this unit discharged to Woodbridge Creek.
- **No. 4 Separator (SWMU 35):** The No. 4 Separator included a pond referred to on Refinery drawings as the Gentry Pond. This unit operated from approximately 1950 to 1977. Aerial photos indicate that this unit discharged to Woodbridge Creek.
- **Surge Pond (SWMU 2):** The Surge Pond was constructed in approximately 1950. It is likely that the Surge Pond received the majority of the stormwater runoff from the North Field and Main Yard. Oil/water separator sludge, tank bottoms and other wastes were placed in the Surge Pond after its original function for stormwater retention was superseded by the NFB in approximately 1960.
- **NFB (SWMU 1):** The NFB was created in 1960 to replace the Surge Pond for stormwater retention and to provide aggressive biological treatment prior to discharge to Woodbridge Creek.
- **No. 2 and No. 3 Separators:** These Separators were associated with the Surge Pond and the NFB, and recovered oil from these units prior to discharge to Woodbridge Creek. The units are now part of the ETP (SWMU 31).

Dredged materials removed from these oil/water separator systems during maintenance were reportedly placed in an area now known as the Mud Flats (SWMU 43), which were constructed in approximately 1955. The Mud Flats were also reportedly used as a spent catalyst disposal area in the mid 1950's.

Between 1976 and 1987

In 1976, Chevron constructed the ETP in the North Field adjacent to Woodbridge Creek. The addition of the ETP significantly upgraded Chevron's ability to treat process water and stormwater runoff (see Section 2.3.1). Between 1976 and 1987, all wastewater and

stormwater discharges, with the exception of a small volume of stormwater discharge to Spa Spring Creek, were routed through the OWSS to the ETP for advanced oil recovery and biological treatment, prior to discharge to Woodbridge Creek. Stormwater in excess of treatment capacity was held in the NFB prior to treatment at the ETP.

Excess stormwater runoff from the Central Yard, West Yard, Amboy Field, Main Yard and North Field was collected in the NFB and then routed to the ETP when treatment capacity was available. Water passing through the No. 2 and 3 Separators was routed to the ETP. After the construction of the ETP, several of the old oil/water separator systems were taken out of service including the Old Pond/No. 1 Separator, No. 4 Separator and the oil/water separator near the EYB.

In 1976, Chevron constructed the EYB (SWMU 3) to replace the oil/water separator near the EYB, which discharged to the Arthur Kill. The EYB was equipped with a pump station that routed the water via the OWSS to the new ETP in the North Field.

After 1987

In 1987, Chevron stopped using the NFB and EYB as stormwater holding impoundments. No stormwater was diverted to the NFB and EYB after 1987. Chevron stopped placing sludge and other wastes in the Surge Pond in October 1985. Removal of these units from service was the first step in the closure of these units.

The temporary East Yard stormwater storage capacity provided by the EYB was replaced by a single stormwater holding tank (Tank 765). The temporary North Field stormwater storage capacity provided by the NFB was replaced by a series of four stormwater holding tanks (Tanks 326, 327, 328 and 330). The excess water diverted to the holding tanks during storm events is routed to the ETP for treatment.

2.3.1 Effluent Waste Treatment Plant

Process water and stormwater are processed at the ETP prior to being discharged into Woodbridge Creek. The unit processes at the ETP include:

- Primary oil removal in an API Separator;
- Secondary oil removal in an Induced Air Flotation (IAF) Unit;
- Aeration and 24-hour equalization in the equalization tank;
- Removal of dissolved contaminants with a biodisk system;
- Removal of suspended solids in a clarifier; and
- Additional equalization in a post-aeration basin prior to final discharge to Woodbridge Creek.

A brief description of the ETP's unit processes is provided below.

Primary Deoiling

Wastewater is collected in various sewers and routed to a diversion box. Flows of up to 3,000 gallons per minute (gpm) pass through the diversion box to the No. 3 API Separator for primary deoiling. In this separator, free oil floats to the top, where it is skimmed. Suspended solids settle to the bottom, where they are collected and periodically pumped out.

Secondary Deoiling

Secondary deoiling occurs in two IAF units. Water is pumped to the IAF units from the No. 3 Separator effluent pump. Various chemicals are added to the water prior to the IAF process for pH control and to assist with the deoiling. The majority of the remaining free oil, emulsified oil and suspended solids are removed in the IAF units by floating them to the top with air bubbles, where they are skimmed off of the water. The oily float is routed to a float separation tank, so that the oil, water and solids may separate. The collected oil is sent to the "Recovered Oil System" and later recycled at the Crude Unit. The water is either returned to the API Separator for further deoiling or routed to the equalization tank.

Aeration

The IAF effluent enters the equalization tank, where it is further aerated by a series of aerators driven by large air blowers. Equalization and aeration are performed to reduce large fluctuations in the water quality, since slugs of highly contaminated water or water with a high or low pH is toxic to the biogrowth. The effluent from the equalization tank flows by gravity to the biodisks.

Biological Treatment

Biological treatment of the effluent is performed using rotating biodisks. The revolving disks allow the wastewater to contact films of biological growth where dissolved contaminants are removed.

The biodisks consist of a set of corrugated polyethylene disks mounted on horizontal shafts. Approximately half of the disk is submerged in the wastewater, while the other half is exposed to air. The polyethylene media provides a surface on which the microorganisms may grow. The disks rotate slowly through the water and are alternately exposed to air and wastewater allowing the microorganisms to consume soluble organic matter in the wastewater. The effluent from the biodisks flows to the clarifier tanks.

Clarification

Suspended biomass is allowed to settle out of the water in the clarifier tanks. Water entering the clarifiers flows in an outward direction causing solids to sink to the bottom

of the clarifier and form a solids layer. The solids layer is scraped up and disposed of periodically. The effluent from the clarifier flows to the Post Aeration Basin (PAB).

Post Aeration

The purpose of the PAB is to aerate the water when necessary and raise the dissolved oxygen level of the water before discharge to Woodbridge Creek. A floating high-speed aerator provides the necessary mixing and aeration. The aerator works by dispersing a spray of water out and around it and creating surface turbulence. As the under-aerated water contacts air in the spray cloud or at the turbulent surface, oxygen from the air diffuses into the water. Air entrained by the turbulent water is carried below the surface where oxygen transfer to the water continues. The effluent from the PAB is discharged to Woodbridge Creek via a 24-inch diameter underground outfall line.

2.3.2 Historical Waste Spill Management Practices

Waste and product spill histories for the individual units listed in the Refinery's HSWA Permit were presented in Section 3.1 of the DOCC. These spill histories were based on Refinery records. The reporting was limited to spills that were clearly attributable to SWMUs and/or AOCs. For the purposes of the DOCC, no attempt was made to determine which spills were considered reportable by the various local, state and federal authorities.

2.4 Environmental and Operational Permit History

The following sections describe the history of environmental permits required for Refinery operations, including a record of the permits issued for the Refinery and other pertinent government regulatory actions.

The Refinery's environmental operating permits and programs include the following:

- RCRA Part A Permit;
- RCRA Closure Plan;
- New Jersey Pollutant Discharge Elimination System (NJPDES) Discharge to Surface Water (DSW) Permit;
- NJPDES Discharge to Groundwater (DGW) Permit;
- Tank Air Permits - Relevant to SWMUs and AOCs;
- Source Permits - Relevant to SWMUs and AOCs; and
- New Jersey Facility-Wide Permit (FWP).

2.4.1 History of Chevron's Environmental Permits

The major milestones in the history of Chevron's permits governing its waste streams include:

-
- 1974–1979 The Refinery was apparently operating under a National Pollutant Discharge Elimination System (NPDES) DSW permit from EPA, although no records of this permit are available.
- 1979–1984 The Refinery operated under an NPDES DSW permit from EPA. Chevron monitored one surface water discharge point.
- 1980 Chevron submitted a RCRA Part A Permit Application to EPA, and received interim status under RCRA. Chevron’s active hazardous waste storage units included the NFB, Surge Pond, EYB and the Landfarm.
- 1984 Chevron elected to implement closure of the hazardous waste storage/disposal facilities rather than file a RCRA Part B Permit Application with NJDEP, which had received the authority to implement RCRA from EPA.
- 1985 Chevron submitted its initial RCRA Closure Plan to NJDEP.
- 1985 Permit jurisdiction for discharges to surface water changes from EPA to NJDEP.
- 1985–1990 The Refinery operated under an NJPDES Permit with DSW and DGW aspects. Chevron monitored two surface water discharge points.
- 1985–Present Chevron performed quarterly groundwater monitoring for the closure units.
- 1988 Chevron submitted a *Revised RCRA Closure Plan* to NJDEP.
- 1989 Chevron submitted a revised RCRA closure plan entitled *Surface Impoundment and Landfarm Closure Plan* to NJDEP.
- 1991 Chevron received a Tidelands Interim License (90-0267-T) as part of the closure project to work within the tidelands, which are owned by the State of New Jersey.
- 1991 Chevron applied for and received a Waterfront Development Permit, Freshwater Wetlands Statewide General Permit and Freshwater Wetlands Transition Area Waiver.
- 1991–1992 NJDEP approved Chevron’s *Surface Impoundment and Landfarm Closure Plan*. The approval for this document was issued in the form of an NJPDES DGW Permit.
- 1992 Chevron received a Notice of Violation (NOV) from NJDEP for an unpermitted discharge to a surface water ditch along Amboy Avenue.
-

Chevron applied for and received a modification to the NJPDES DSW Permit to include this ditch.

- 1993 Chevron received a final NJPDES DGW Permit that governed the closure of the NFB, Surge Pond, EYB and the Landfarm. This permit specified new groundwater monitoring requirements for the closure units.
- 1993-1998 Chevron operated under a Final NJPDES DSW Permit Reissuance. Chevron monitored four surface water discharge points.
- 1994 NJDEP issued a Major Modification to Chevron's Final NJPDES DGW Permit, which specified quarterly sampling of leachate from the Landfarm for five years.
- 1998 Chevron received a New Jersey FWP from NJDEP. This permit replaced NJPDES DSW Permit No. NJ0000221 and all applicable NJDEP Air Pollution Control (APC) Certificates for current refinery operations.

2.4.2 RCRA Part A Permit Application

In 1976, when RCRA was promulgated, Chevron was operating four units that were subject to RCRA. They included three surface impoundments and the Landfarm, which was a closed waste treatment unit. The units included:

- The NFB (SWMU 1);
- The Surge Pond (SWMU 2);
- The EYB (SWMU 3); and
- The Landfarm (SWMU 4).

The NFB and EYB were primarily used for stormwater retention prior to discharge to the ETP. As discussed in Section 2.3.1, the ETP recovers entrained and dissolved oil, and treats process water and stormwater runoff generated at the Refinery. The NFB and EYB were used as retention facilities for stormwater that exceeded the ETP's treatment capacity. The Surge Pond and Landfarm both contain Refinery wastes including tank bottoms, API separator sludge and IAF float. The Surge Pond was used to store these wastes, and the Landfarm was used as a pilot waste treatment facility.

In 1980, Chevron submitted its RCRA Part A Permit Application for interim status facilities to EPA, resulting in interim status for the waste management facilities regulated under RCRA. In 1984, NJDEP requested that a Part B Permit Application be submitted for interim status facilities. Rather than completing and submitting a RCRA Part B Permit, Chevron opted to implement closure of the hazardous waste storage/disposal facilities. After additional record searches, it was determined that no listed hazardous wastes were ever placed in the NFB or the EYB.

In 1990, sludges from the NFB and EYB were sampled and toxicity characteristic leachate procedure (TCLP) analyses were conducted. The results confirmed that the sludges in the NFB were non-hazardous. However, the EYB sludges were determined to be characteristically hazardous due to benzene (D018). In about 1998, the sludges in the NFB were determined to be characteristically hazardous, due to reactive sulfides (D003). Since it has been discovered that the NFB received dry weather flow in the 1960's, the bottom layer of sludge in the NFB might be classified as a listed hazardous waste (F037 and F038) if removed.

2.4.3 RCRA Closure Application

On March 26, 1985, Chevron submitted the initial *RCRA Closure Plan* (1985 Closure Plan). This plan involved an in-situ closure cell in the NFB. The 1985 Closure Plan was not accepted by NJDEP because the proposed land disposal of wastes would occur within the 100-year floodplain of Woodbridge Creek. Based on these concerns, Chevron submitted a *Revised RCRA Closure Plan* to NJDEP in March 1988 (1988 Closure Plan).

Although NJDEP did not comment on the 1988 Closure Plan, Chevron subsequently submitted a *Surface Impoundment and Landfarm Closure Plan* dated September 19, 1989 (1989 Closure Plan). This plan offered alternatives to the 1988 Plan, including proposed remediation of the basin sludges via a solvent extraction methodology, as well as bioremediation of the Landfarm.

Concurrently with the submittal of the 1989 Closure Plan, Chevron began investigations and permitting pursuant to environmental media regulated by the NJDEP Division of Coastal Resources, based on concerns raised during the review of the 1985 Closure Plan. These permits were required due to the presence of regulated areas on the Refinery including: (1) freshwater wetlands and associated transition areas; (2) State Open Waters; and (3) riparian tidelands in the vicinity of the proposed remedial activities.

On February 1, 1991, Chevron applied for and received the following permits:

- Waterfront Development Permit No. 1216-90-0001.3 and Water Quality Certificate;
- Freshwater Wetlands Statewide General Permit No. 1216-0001.4; and
- Freshwater Wetlands Transition Area Waiver No. 1216-0001.4.

These permits specified the cleanup, excavation, filling, grading and closure requirements for three hazardous waste surface impoundments (the NFB, the EYB and the Surge Pond). The permits referenced the 1989 Closure Plan as the approved closure document. However, as was noted in Chevron's transmittal of this document to the Division of Coastal Resources, the 1989 Closure Plan was undergoing major modifications by the Bureau of Groundwater Pollution Abatement.

No permit was required from the Bureau of Stream Encroachment, as the proposed work within the floodplain of Woodbridge Creek was permitted under the Waterfront Development Permit.

Chevron revised the 1989 Closure Plan and incorporated changes in remedial methodology. The revised closure plan, entitled *Surface Impoundments and Landfarm Closure Plan* (1991 Closure Plan), was submitted to NJDEP in October 1991. The primary remedial methods proposed in the 1991 Closure Plan were mechanical dewatering, thermal separation and recycling of the sludge and soils from the NFB, EYB and the Surge Pond. The solvent extraction method presented in the 1989 Closure Plan was listed as a secondary method, due to concerns about its ability to achieve the desired results. The primary remedial method proposed for closure of the Landfarm (bioremediation) remained the same.

In October 1991, NJDEP approved the 1991 Closure Plan. The approval for this document was issued in the form of an NJPDES DGW Permit (NJ0080390). This permit incorporated the proposals for closure in Chevron's Closure Plans and was the regulatory mechanism for implementing closure. This permit is further discussed in Section 2.4.5.

2.4.4 NJPDES Discharge to Surface Water Permits

Chevron is currently monitoring the effluent from the ETP, which is discharged to Woodbridge Creek under its FWP. Chevron previously monitored discharges to Spa Spring Creek and a drainage ditch in Amboy Field. The following is an historical breakdown of Chevron's DSW Permits with key information:

June 1974 to Approximately 1979

Available records indicate that the Refinery was operating under an NPDES DSW permit during this period. NJDEP was not the implementing agency at this time. No relevant information for this period is currently available.

July 3, 1979 to Approximately 1984

Available records for the 1979 DSW permit describe only Discharge Point 004, which was listed as effluent from the Power Plant to Spa Spring Creek. It is likely that this permit also covered the ETP. Although these permits are generally issued for five year periods, it appears that they have remained in effect past their expiration until successful negotiation of the new permit.

- **Units Covered:** Discharge Serial Number (DSN) 004: Power Plant - non-contact cooling water from turbo generator condenser.
- **Significant Changes from Previous Issuance:** No copies of an earlier permit have been located. However, it appears from the 1979 DSW permit that this discharge point (DSN 004) has been regulated since June 14, 1974.

- **Parameters Monitored:** Flow (million gallons per day (MGD)), pH, temperature (winter and summer), biochemical oxygen demand (BOD), chemical oxygen demand (COD), total suspended solids (TSS), specific conductance, settleable matter, total organic carbon (TOC) and oil and grease.
- **Discharge Point Used:** DSN 004 - Ditch to Spa Spring Creek to Woodbridge Creek.
- **Monitoring Events:** Flow and temperature were reportedly continuously monitored. TOC, oil and grease and pH were monitored bimonthly. No indication was given regarding the frequency of sampling for the remaining analytes.

January 25, 1985 to Approximately 1990

In 1985, DSW Permit jurisdiction was transferred from EPA to NJDEP. NJPDES DSW Permit No. NJ0000221 allows the Refinery to discharge process water and stormwater to surface waters, which include Spa Spring Creek and Woodbridge Creek.

- **Units Covered/Discharge Points Monitored:** This permit covered two discharge points: DSN 004 and DSN 005.

DSN No. 004: Spa Spring Creek - covered power plant water softener regeneration water and stormwater runoff from non-process areas of Chevron, as well as from property owned by others and from public roads.

DSN No. 005: Woodbridge Creek - covered process water and contaminated stormwater runoff that is treated by the ETP using mechanical and biological methods.

- **Significant Changes from Previous Issuance:** Significant changes in the 1985 DSW Permit included the change of jurisdiction and the inclusion of DSN 005, located at the outfall of the ETP.
- **Parameters Monitored:**

DSN 004: Flow (MGD), COD, BOD, TSS, fecal coliform, total residual chlorine, temperature, pH, petroleum hydrocarbons, oil and grease, floating solids and foam.

DSN 005: Flow (MGD), COD, BOD, TSS, fecal coliform, total residual chlorine, temperature, petroleum hydrocarbons, oil and grease, ammonia, sulfide, chromium (total and hexavalent), floating solids, foam and 96-hour acute mycid bioassay.
- **Monitoring Events:** Bioassay tests were conducted quarterly; other parameters were analyzed monthly.

October 1992 Modification

Chevron applied for and received a modification to the NJPDES DSW Permit in response to an NOV from the NJDEP. On September 16, 1992, NJDEP issued an NOV to

Chevron for an "unpermitted discharge to surface water ditch on Amboy Road". The NOV required Chevron to either apply for a permit modification to the existing NJPDES permit to include the ditch, or apply for a general stormwater permit for the discharge. The permit modification incorporated the stormwater runoff from undeveloped portions of Amboy Field to a discharge point entering a ditch along Amboy Avenue.

- **Units Covered:** Discharge to point No. 006, which received stormwater runoff from Amboy Field to the Amboy Ditch. Its estimated average flow was 50 gpm.
- **Parameters Monitored:** According to a file memorandum, "no limits will be placed on the parameters being monitored. Once enough data has been collected to demonstrate that the water in the ditch is harmless, sampling may be discontinued."

August 1, 1993 to July 31, 1998

On June 25, 1993, NJDEP issued a Final NJPDES DSW Permit Reissuance to Chevron, which became effective August 1, 1993. The revisions to the permit enabled Chevron to accurately monitor contributions to the Spa Spring Creek outfall and discharges associated with the sludge dewatering operations.

- **Units Covered/Discharge Points Monitored:**
 - DSN 004A, 004B and 004C: Spa Spring Creek Outfalls
 - DSN 005: ETP
 - DSN 005A: Parshall Flume from ETP
 - DSN 006A: Runoff from undeveloped portion of Amboy Field to Amboy Ditch
- **Significant Changes from Previous Issuance:** The single terminal discharge point, known as DSN 004, was identified as DSN 004A, and two upstream monitoring points, identified as DSN 004B and DSN 004C, were added. The final reissuance also incorporated several modifications to the draft permit, primarily with respect to the additional discharges from the ETP, which would occur during the dewatering phases of work associated with CEMC.
- **Parameters Monitored:**
 - DSN 004A: Not monitored.
 - DSN 004B and DSN 004C: Flow (MGD), pH, TSS, chloroform, COD, total lead, petroleum hydrocarbons, thallium and total zinc.
 - DSN 005: ETP
 - DSN 005A: Flow (MGD), temperature, BOD, TSS, oil and grease, COD, ammonia as nitrogen, sulfide, phenolic compounds, total chromium, hexavalent chromium, pH, total recoverable nickel, total recoverable arsenic, total recoverable zinc and chronic toxicity.

DSN 006A: COD, flow, TSS, total petroleum hydrocarbons (TPH) and pH.

March 1, 1999 to Present

The Refinery is currently monitoring the effluent from the ETP, which is discharged to Woodbridge Creek under its FWP (see subsection 2.4.7). The Refinery is no longer monitoring discharges to Spa Spring Creek and the drainage ditch in Amboy Field.

2.4.5 NJPDES - Discharge to Groundwater Permits

This subsection discusses the history of the groundwater monitoring programs related to the units under RCRA closure.

Interim NJPDES DGW Permit No. NJ0000221

In 1985, Chevron received its initial interim NJPDES permit (NJ0000221) to monitor groundwater for the closure of the Landfarm, North Field Waste Management Area (NFWMA) and the EYB. The permit carried an effective date of June 15, 1985. The monitoring network covered under this permit included the following wells:

- Landfarm: LF1A, LF1B, LF2, LF3, LF4 and LF4C;
- NFWMA: DM4, NF8, NF9B, NFC and NF9C; and
- East Yard: SB10, SB11, SB12 and SB13B.

The groundwater monitoring parameters for each set of wells are described in detail in the DOCC. The groundwater monitoring was primarily conducted on a quarterly basis, although some of the parameters were only required to be measured biannually or annually.

NJPDES DGW Permit No. NJ0080390

In 1992, NJDEP issued Final NJPDES Permit No. NJ0080390 to Chevron. This new permit replaced the DGW aspects of NJ0000221, but did not affect the surface water aspects of the previous permit. The effective dates of the new permit were from May 1, 1992 to April 30, 1997. This permit regulated the performance of groundwater monitoring at the Landfarm, NFWMA and EYB in accordance with the 1991 Closure Plan.

The monitoring network covered under this permit included the following wells:

- NFWMA: NF-10, NF-11, NF-12, NF-13, NF-14 and NF-15;
- EYB: SB-14, SB-15, SB-16 and SB-17; and
- Landfarm: LF-1B, LF-3, LF-5 and LF-6.

In addition, the permit required collecting potentiometric measurements from the following wells: NF-5B, NF-8, NF-9B, SB-13B, LF-4 and LF-4C. The groundwater monitoring parameters for each set of wells are described in the DOCC. The groundwater monitoring was primarily conducted on a quarterly basis; however, the permit only required some of the parameters to be measured annually.

This permit required Chevron to continue to monitor groundwater in accordance with their approved *Groundwater Quality Assessment Plan* for the SB-11 Area. It also required Chevron to revise the detection groundwater monitoring program for the NFWMA, which included the NFB, Surge Pond, EYB and the Landfarm. To establish this monitoring system, Chevron installed 12 additional wells (NF-10, 11, 12, 13, 14 and 15 in the NFWMA; SB-14, 15, 16 and 17 in the EYB area; and LF-5 and 6 in the Landfarm Area).

Chevron was also required to sample existing wells LF-1B and LF-3 in the Landfarm. Analytical parameters for quarterly sampling of these areas were established in the DGW Permit. Water level data from wells NF-5B, NF-8, NF-9B, SB-13B, LF-4 and LF-4C were also required in addition to the 12 wells listed above for the purpose of monitoring groundwater flow direction.

The DGW permit also established the conditions for the closure of the surface impoundments. These conditions were divided into closure requirements for the Surge Pond, NFB and EYB, the *Groundwater Quality Assessment Plan* for the EYB, and specific Landfarm closure requirements.

Closure requirements for the surface impoundments specified compliance with the 1991 Closure Plan and established waste handling and disposal criteria. The permit also required that Chevron submit a report detailing the results of work that was conducted pursuant to the *July 1990 Proposed Groundwater Quality Assessment Plan for the SB-11 Area and Proposed Modifications to the NJPDES Ground Water Monitoring System*. This plan and associated work covered the presence of free-phase hydrocarbons in well SB-11 located in the EYB. The third specific condition required under this permit covered the closure of the Landfarm.

Draft Major Modifications to the NJPDES DGW Permit NJ0080390

In July 1993, NJDEP issued draft major modifications to the NJPDES DGW Permit (effective June 1, 1994). These modifications included requirements for the post-closure care and monitoring requirements of the Landfarm, and modified the list of monitoring parameters for the Landfarm and the other units.

The Landfarm underwent aggressive bioremediation during closure. Currently, the Landfarm residue has been sufficiently degraded and a vegetative cover has been established to prevent erosion. Chevron's remaining obligation at the Landfarm is to conduct post-closure monitoring under the NJPDES Permit. The purpose of the post-closure monitoring was to demonstrate that the closure of the Landfarm had sufficiently

immobilized the hazardous wastes that were contained in the Landfarm. Quarterly sampling of the discharge from the leachate collection system was conducted for a period of five years. Until 1998, leachate sampling parameters included arsenic, chromium, lead and nickel.

The priority pollutant list was dropped from the groundwater monitoring parameters. The remaining groundwater monitoring parameters for the NFB, Surge Pond, EYB and Landfarm monitoring well networks are arsenic, chromium, lead and nickel. Monitoring was to be conducted quarterly in January, April, July and October for a period of five years. Chevron continues to monitor groundwater in the EYB and NFB-Surge Pond areas on a quarterly basis; however, the Landfarm has been closed. No further groundwater sampling is conducted at the Landfarm. Chevron currently only monitors the vegetative cover for the Landfarm.

2.4.6 Air Permits

There were at one time 151 storage tanks at the Refinery. Currently, 137 tanks appear in the FWP. The description of tank permits provided in Table 2-3 is limited to tanks and tank basins associated with SWMUs and AOCs covered under Chevron's HSWA Permit. These tanks were either listed as SWMUs, due to reported TEL burials within the tank basins, or as AOCs, due to photographic evidence of potential releases from the tanks into the tank basins.

Table 2-3. Storage Tank Air Permits

Tank No.	Permit Status	Tank Status	Comments
1	Being dropped from the permit	Dismantled	Tank cleaned and dismantled
3	Being dropped from the permit	Dismantled	Tank cleaned and dismantled
4	Being dropped from the permit	Dismantled	Tank cleaned and dismantled
14	Permitted	Active - asphalt	
23	Permitted	Active - mid distillate	
27	Permitted	Active - crude oil	
28	Permitted	Active - mid distillate	
301	Permitted	Inactive - stand-by status	Tank cleaned
302	Permitted	Active - spent caustic	
305	Permitted	Active - stormwater	
306	Permitted	Active - spent caustic	
326	Permitted	Active - wastewater	
329	Permitted	Inactive - stand-by status	Tank stripped
723	Permitted	Active - recovered oil	
753	Permitted	Active - naphtha	
771	Permitted	Active - crude	

Source Permits

There are significant air sources on the Chevron Refinery including furnaces, heaters, a flare, tanks and miscellaneous ETP equipment. Only two of these are associated with units listed as SWMUs or AOCs within Chevron's HSWA Permit. These two sources are separators associated with the ETP, one of which is currently inactive. The source air permits are summarized in Table 2-4 below.

Table 2-4. Source Air Permits

Source	Permit Status	Comments
No. 2 Separator	Not permitted	Inactive
No. 3 Separator	Permitted	Active

2.4.7 New Jersey Facility-Wide Permit

In January 1999, the NJDEP issued a New Jersey FWP (No. NJ00011) to Chevron, which is in effect from March 1, 1999 until February 28, 2004. The FWP replaced the NJPDES DSW Permit No. NJ0000221 and all applicable NJDEP APC Certificates. The FWP identified 11 regulated processes at the Refinery including:

- Wharf;
- Storage tanks;
- Crude Unit;
- Asphalt Plant;
- NaSH Plant;
- Loading racks;
- Flares;
- Power Plant;
- Cooling Tower;
- ETP; and
- Emergency diesel equipment.

The FWP describes the operation of each of the 11 regulated processes and identified emissions and/or effluents generated by the processes. For each regulated process, the FWP specifies the regulated equipment, hourly emission limits and compliance plan, which includes record keeping, monitoring and reporting requirements.

The FWP renewed the permit for the ETP outfall, identified as DSN 005A, to discharge treated process water to Woodbridge Creek and specified effluent limits. The monitored parameters include: flow (MGD), temperature, BOD, TSS, oil and grease, COD, ammonia as nitrogen, sulfides, phenolic compounds, total chromium, hexavalent chromium, pH, total recoverable zinc, total recoverable arsenic and chronic toxicity

(IC25). The FWP no longer requires monitoring, record keeping and reporting for DSN 004B and DSN 006A.

Title V Facility Wide Permit

In March of 2003, Chevron submitted an NJPDES Permit Renewal Application to NJDEP. In addition, Chevron is currently in the draft phase of converting its FWP into a Title V FWP. The final Permit will be issued in 2004.

Chevron U.S.A. Inc. Perth Amboy Refinery Perth Amboy, NJ

Land Use / Drainage

KEY

- Residential
- Transportation/Utilities
- Industrial/Commercial
- Recreational Land
- River Channels
- Arthur Kill
- Wetlands
- Barren or Altered Lands
- Forest
- Brushland/Shrubland
- Site Boundary
- Roadways
- Railways
- Topographic Contours (in feet)
- State Boundary
- On-site Structural Features
- Surface Drainage (arrows indicate direction)
- Containment Structures
- Hydrography
- Catch Basins, Sumps, & Valves
- Monitoring Wells

PREPARED BY:
Coastal Environmental Services, Inc.
2 Research Way
Princeton, New Jersey 08540
(609) 987-0966
JANUARY 1993

Coordinate tics indicate NJ State Plane Coordinates.

Data accuracy limited by accuracy and scales of original sources. Site-specific conditions should be field verified.

Sources:

Preparedness Prevention & Contingency Plot Plan, Drawing CF-100A-30282-00, Chevron U.S.A. Inc., Perth Amboy Refinery, 1 June 1992, (1:24,000).

Freshwater Wetlands Map, NJDEP; Arthur Kill NW, Elizabeth SW & SE, 1986 Aerial Photo (1:12,000).

USGS Topographic Maps; Jersey City NJ-NY, Elizabeth NJ-NY, Arthur Kill NJ-NY quadrangles, 1981 (1:24,000).

USGS Flood-prone Area Maps, Jersey City NJ-NY, Elizabeth NJ-NY, Arthur Kill NJ-NY quadrangles, 1975 (1:24,000).

National Wetland Inventory Map, Jersey City NJ-NY, Elizabeth NJ-NY, Arthur Kill NJ-NY quadrangles, 1976 (1:24,000).

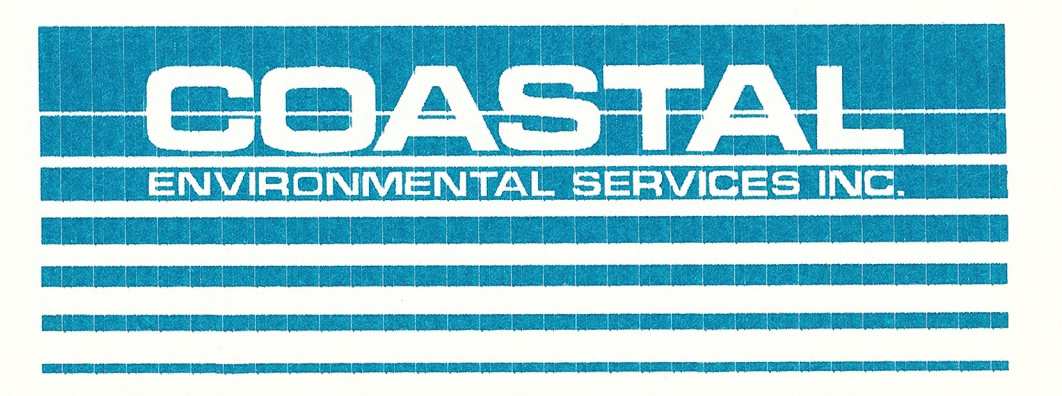
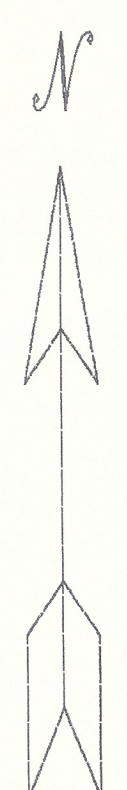
USGS Topographic, 1986, and NWI, 1976, Digital Data (1:24,000).

Tri-State Regional Planning Commission, Union and Middlesex County Aerial Photographs, 1987 (1:4,800).

SCALE: 1" = 400'

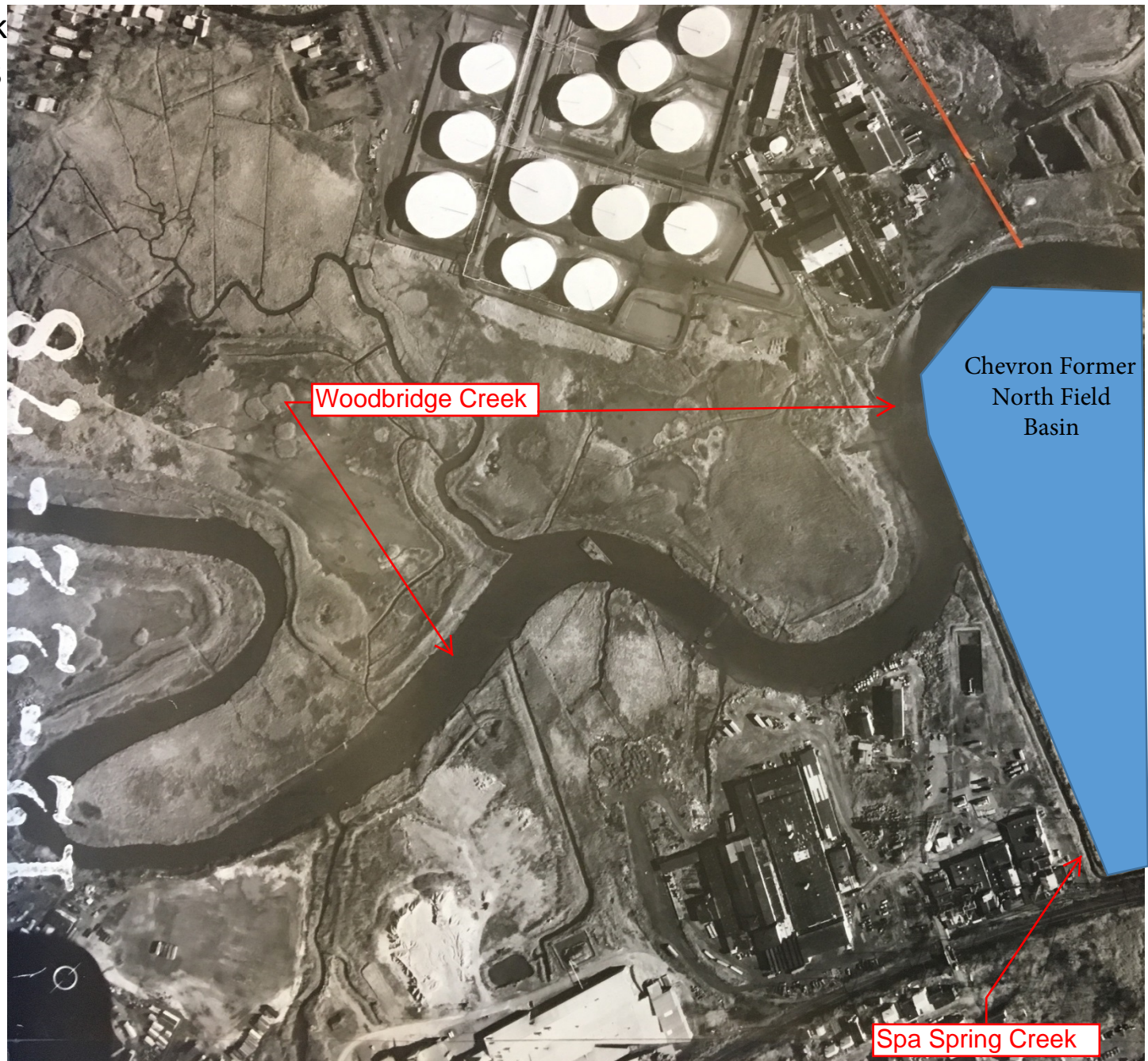


10 Foot Contour Intervals



Woodbridge Creek
Industrial Facilities
Adjacent to
Former Chevron
North Field Basin

1978



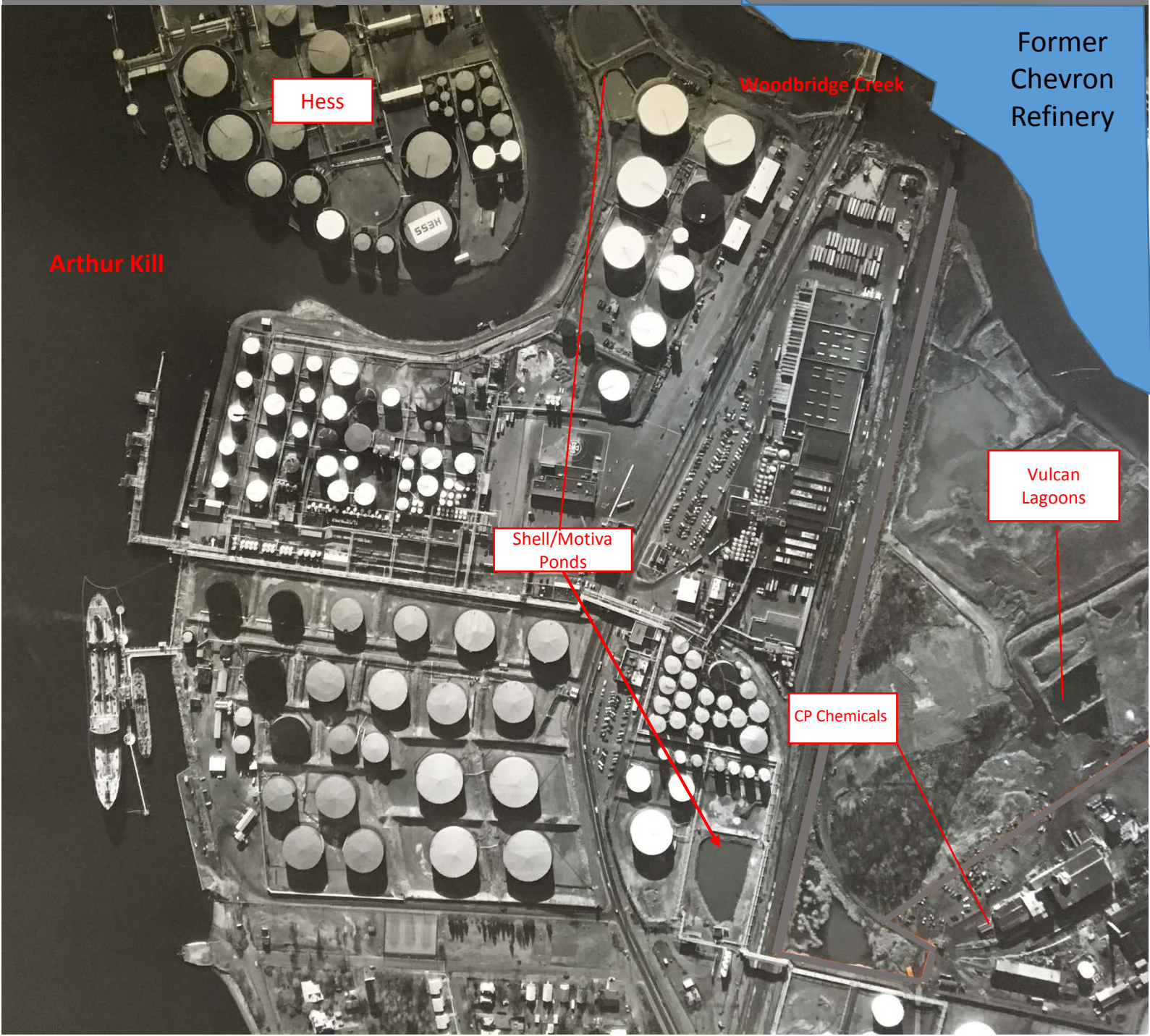
Woodbridge
Creek Industrial
Facilities Adjacent
to Former
Chevron North
Field Basin

1978



Woodbridge
Creek at Arthur
Kill, Former
Chevron
Refinery and
Areas North

1978

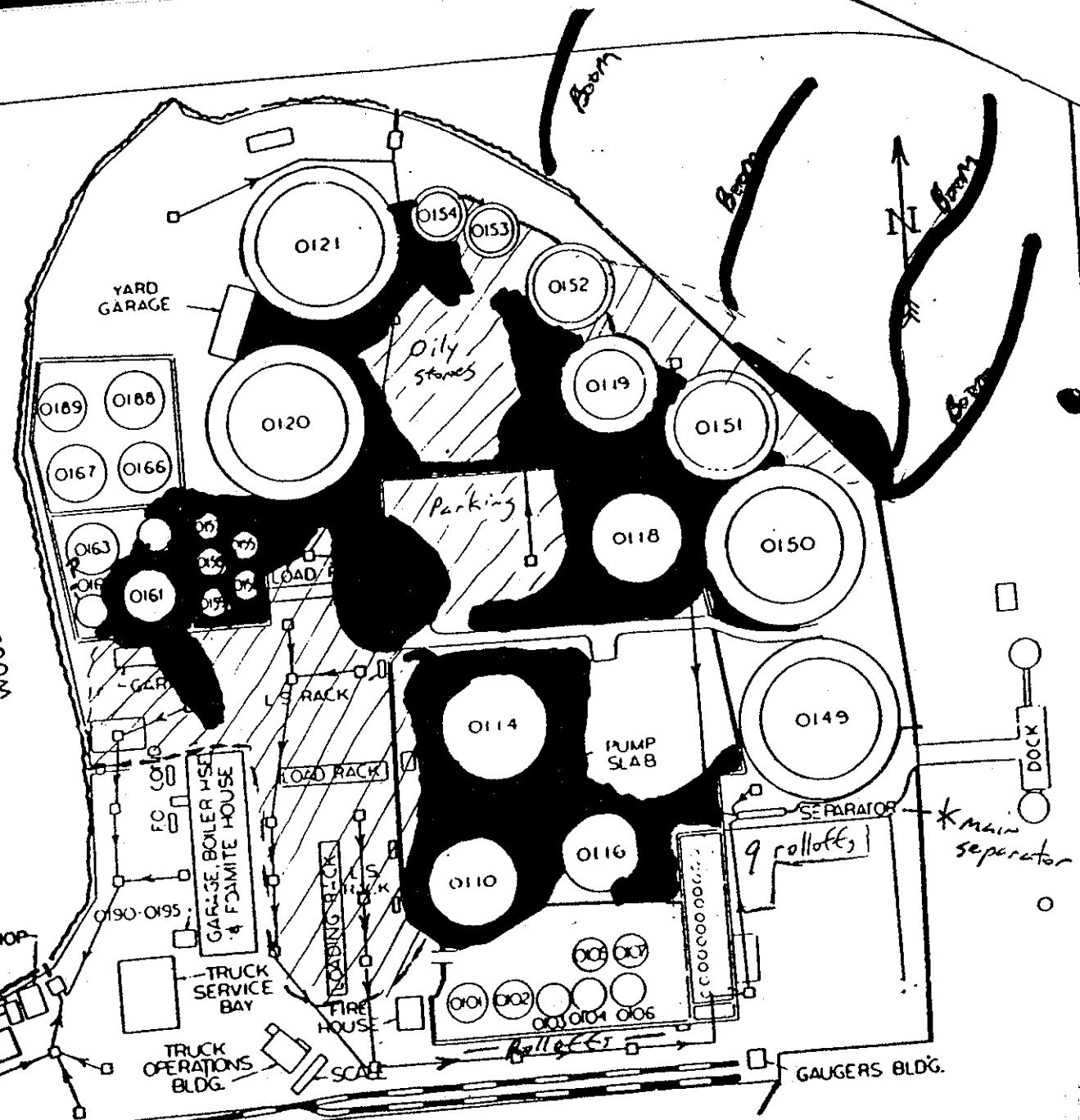
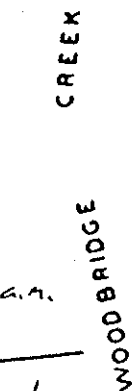


PROPRIETARY INFORMATION
AMERADA H&S CORPORATION

//// - orig (max)
extent
9/6/90 a.m.

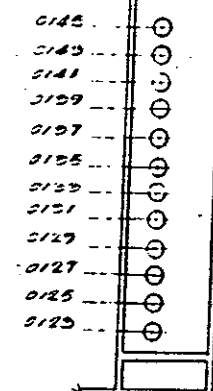
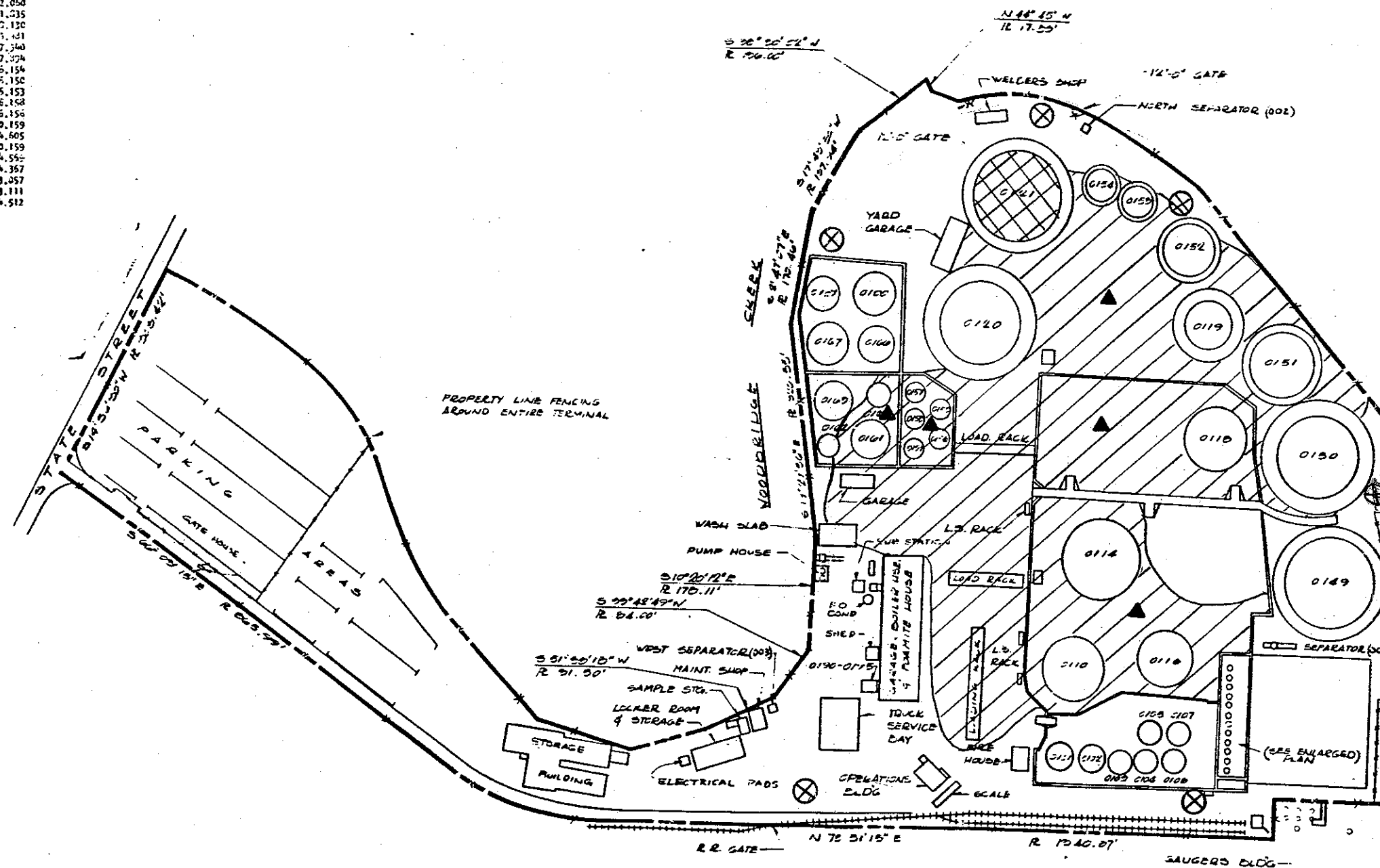
- extent..
9/8/90 - 12:30 a.m.

K. Menge!



0101
 0102
 0103
 0104
 0105
 0106
 0107
 0110
 0114
 0116
 0118
 0119
 0120
 0121
 0140
 0140
 0151
 0152
 0153
 0154
 0155
 0156
 0157
 0158
 0159
 0160
 0161
 0162
 0163
 0166
 0167
 0188
 0189

NOMINAL CAPACITY (Bbls.)
 13,135
 12,315
 5,000
 5,267
 5,264
 5,274
 5,240
 55,218
 71,154
 74,723
 74,140
 50,071
 122,230
 153,847
 132,050
 131,035
 20,130
 11,401
 17,560
 17,564
 5,154
 5,150
 5,153
 5,158
 5,156
 10,159
 24,605
 10,159
 24,590
 24,367
 33,057
 33,111
 24,512



ENLARGED PLAN

- Original Extent of Surface Spill Area
- Dismantled Tank Excavation Area

- Proposed Monitoring Well Location
- Proposed Soil Boring/Sampling Location

REV				DATE				BY				DESCRIPTION				CHECK		APP'D	
APPROVAL				DESIGN				PROJECT ENG.				FINAL APPROVAL							
AMERADA HESS CORPORATION 1 HESS PLAZA, WOODBRIDGE, N.J.																10			
TERMINAL PLOT PLAN																11			

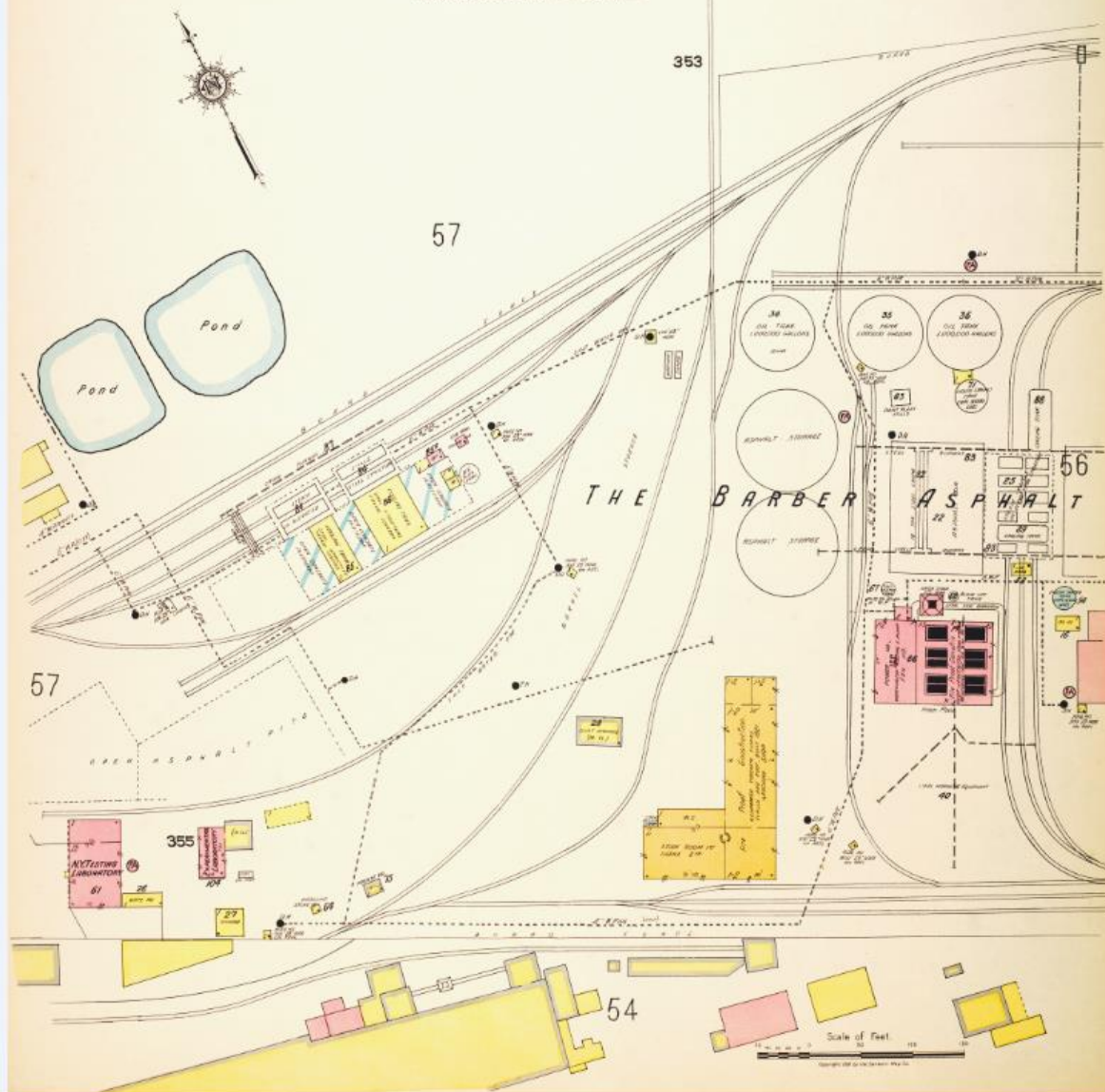


Historical Map 1: View of general area around Woodbridge Creek/Arthur Kill confluence (ca 1921) showing Maurer Co. brickworks, Barger Asphalt, and adjacent ASARCO site.

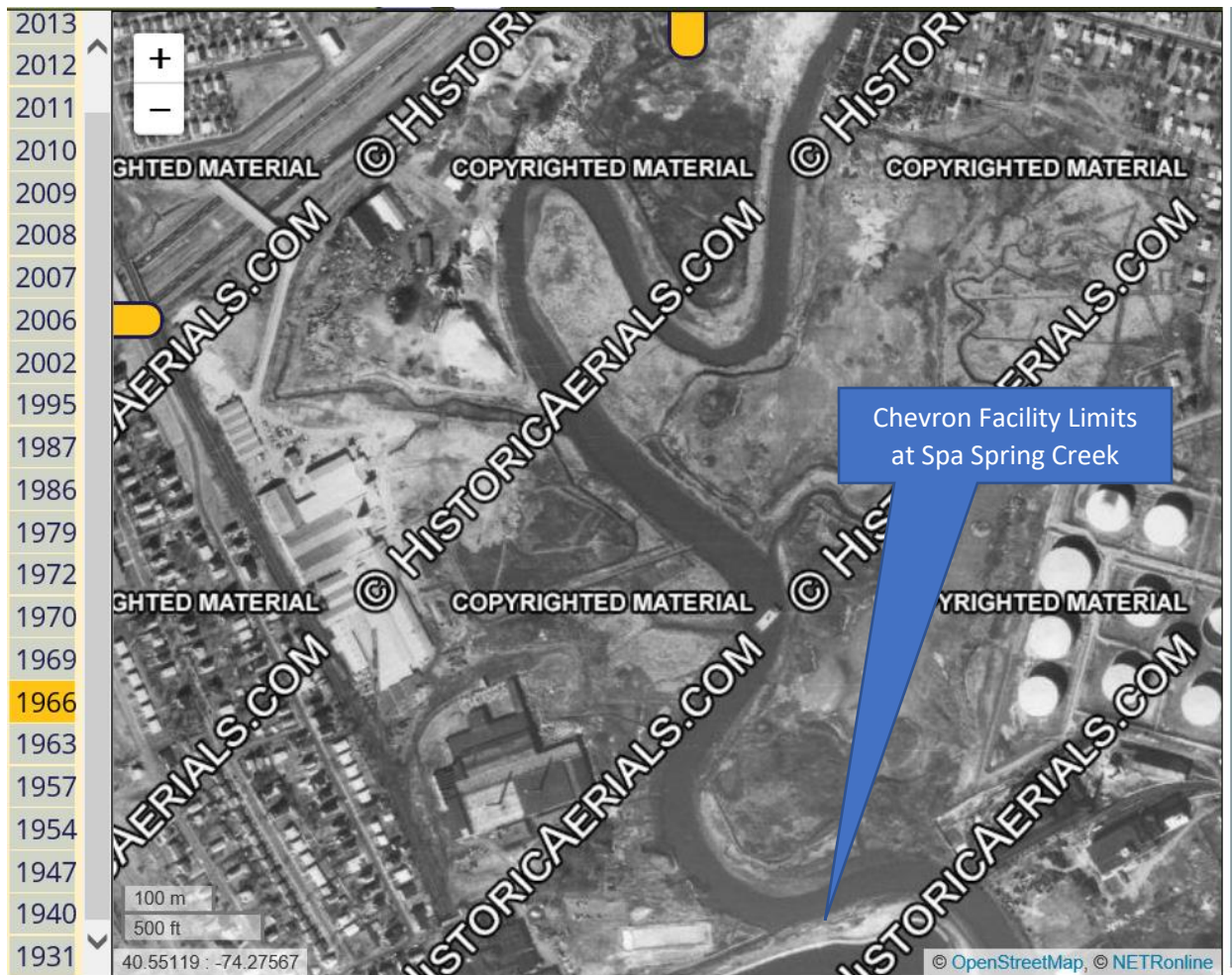
THE BARBER ASPHALT PAVING CO.

[illegible]

Located 2 Miles NE of Perth Amboy City Hall



Historical Map 2: Map ca. 1921 showing The Barber Asphalt Company.



Historical Map 3: View of area upstream of Chevron Facility – ca. 1966 showing regional industrial development.

HISTORIC FILL AREAS

Former Chevron Facility and Adjoining Areas Along Waterways








Copyright NJDEP - Map Printed On 2020-02-12 09:44

Historic Fill Mapping obtained from NJDEP GeoWEB accessed February 12, 2020 TRC Project No. 890

Powered by NJDEP's NJ-GeoWeb

LEGEND

- | | |
|---|--|
| Applications/NJGW_Sites_and_Facilities | |
| Historic Fill | |
|  Historic Fill | |
| FILL | |
|  Quadrangles NotMapped | |
|  No Fill | |
| Applications/NJGW_Base_Layers | |
|  Counties | |
|  MidAtlantic States Boundary | |

REGIONAL HISTORIC FILL MAPPING
Former Chevron Facility – Perth Amboy, NJ